Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

A STUDY OF FOODS AND FOOD SUPPLY

This paper was written, not by the domestic science teacher, but by other teachers who, in their classes in history, geography, and nature study, have found need to use material generally composing a part of the domestic science course. An article must be so written only when cooking is not an isolated activity but an intrinsic part of school living, when the problems of the kitchen are solved in the classroom, and when the social demands of the class are ministered to in the kitchen.

The school plans, for example, to give candy at Christmas to people who are in danger of having none. In consequence of that plan and in response to the motive impelling it, the cooking teacher and the children devise ways and means of making the candy. Perhaps the best time was when the second grade, having made fondant, invited the ninth to help them mold it. The little children and older ones paired off and gaily chatted together while they modeled bonbons and graced them with nuts or raisins, wrapped them in pretty boxes, made Christmas cards to enclose with them, and neatly tied up the parcels. Again, there is a yearly Saturday garden-party, where, instead of wandering in white flannels among blooming flowers, or instead of sipping chocolate under the pergola, as the name "garden-party" implies, the boys of the high school and the men of the faculty doff their coats and vigorously ply spades and rakes to prepare the garden for the spring planting. But hearty gardeners need hearty food, and the girls of the high school enter the kitchen and cook and serve a luncheon. During the spring quarter, too, there is a schoolwide honoring and fêting of the seniors. Usually two or three classes want to express their good fellowship by luncheons, and again the social demand molds the domestic-science course, and the kitchen is full of young cooks learning to make the dishes thought to be most pleasing to senior palates. Frequently, too, grades make sandwiches or little cakes for mothers' meetings held in the afternoons. In many such ways the utensils of the kitchen prove themselves the tools of a socialized group besides being the furnishings of a laboratory, and the cooking teacher becomes a servant of the community as well as a scientist.

Under such conditions what is the purpose of the teaching of domestic science? Not the mere acquiring of skill with egg-beater and mixing-bowl. That skill is needed and is gained, but gained as an incident, not as a prime object. Rather, the great purpose is to encourage social action. Secondary to that follow more academic aims, academic, yet tinged with social meaning and intent—to demonstrate by example and exposition the principle of social coöperation among men; to show the economic and historic significance of the world's food industries; to cultivate a habit of inquiring into physical causes and relations and a habit of making associations, of seeing farther than one's breakfast plate.

The outline of a course with these purposes differs from that of one with purely academic or purely utilitarian aims. It does not have for its main topics, mineral salts, proteins, fats, carbohydrates, and water. Perhaps the outline would read somewhat like this:

Sources of food:
- Natural products.
- Cultivated crops.
- Geographical locations.

Conversion of raw foodstuffs:
- Harvesting.
- Milling.
- Packing.
- Preserving.

Transporting of foods.

Cooking of foods.

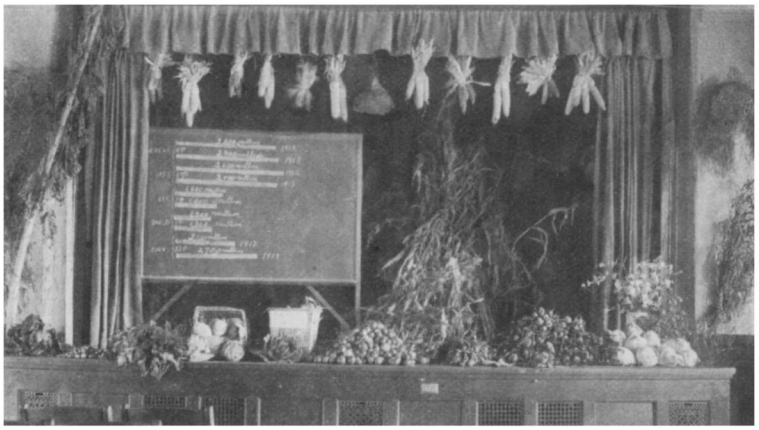
The best way to learn of the sources of food is to produce it. Children who have planted corn, harvested it, converted it into corn-meal, made it into johnny-cake, and eaten it, know what corn-meal is and where it came from. Experience with a school garden, while it may not be quite satisfactory, on account of the lost summers, yet makes very clear that the fruitful earth is indeed our nourishing mother. Every child in our elementary school gets this sort of experience with fructifying seed and productive soil. For there is the flower-garden, enclosed in a picket fence, which the whole school helped to make and paint. In the center of it, in a little plot of grass, stands a sun-dial, the gift of a graduating class. For this little area the seventh grade every year devise arrangements of beds, making their experiments on water-color charts. When they finally

settle on one plan, the high-school geometry class stakes out the intricate system of beds. In another corner of the school grounds is the less romantic vegetable garden, the scene of the boys' garden-party already mentioned. In these two places every grade below the eighth owns beds and plants crops, sometimes as individual preference dictates, sometimes according to concerted class plans—cotton and flax among the textile workers of the fifth, corn among the poultry-raisers of the second. Many children of the upper grades, too, apply for space and plant their heart's desire. Part of the garden work is done in class time, but much of it at odd moments and during play periods. There are lazy gardeners, to be sure, and uninterested ones, but there is also a goodly number of loving hands at work and eager eyes watching, enough to make the garden "a lovesome spot." In addition to these two places, there is a border about the front lawn, filled with shrubs and bulbs and perennials. Here the sixth grade preside, introducing every spring new and attractive things. The kindergarteners seek out little neglected spots that need beautifying with crocuses and sunflowers. The first grade plant a forest of corn around their playhouse. The seventh care for hot-beds, where they start flowers and vegetables for the school garden or for gardens and window-boxes at home.

In the autumn we have our harvest-home festival on the lawn. Every grade garners its corn or cabbages or thyme or beets or Job's tears and piles them attractively on tables. Gradually this display of crops has attracted to itself other exhibits. Cooks from among faculty and children bring their jellies and canned fruits, needlewomen bring their laces and embroideries, collectors their stamps and post-cards and pressed flowers and specimens of minerals, animal-fanciers their cats and dogs and rabbits and birds and ponies, and young mothers their dolls. Children and teachers and parents spend a gay two hours at "The Francis W. Parker County Fair."

Every year when the children are themselves harvesting their crops, the seventh grade make a study of the world yield. Such an investigation gives significance to our little project of a school garden, puts it into its place as an unimportant exemplification of a universal industry. The children's personal garden experience makes a very real basis for the true imaging of the larger situation. A child who has himself put into the ground a dry, dead-seeming seed, all the time marveling at the mystery of its coming revivification,

who has himself cared for the tender sprout and created the right conditions of soil and water to bring about its growth, has some of the mental material for appreciating the astounding spectacle of a world at work in field and garden.



SPECIMENS FROM SCHOOL GARDEN USED AT "COUNTY FAIR" EXERCISE

On the day of the County Fair the seventh grade report to the school some of the results of their study. It has been the aim to present different phases in different years. At one time the subject was the world's wheat crop, with an account of the countries exporting and those importing; again it was the chief world products and the share of various countries in raising them. At another time the report dealt with the comparative value of the chief world products. A fourth topic was the significance of over-production and under-production. We here give a morning exercise, combining the seventh-grade presentation of the world situation and the report upon our own garden.

MORNING EXERCISE: THE COUNTY FAIR

Friday, October 4, 1912

SONG. "Now Sing We a Song of the Harvest."

Mr. Mortensen. After the reading the several grades will tell us what the yield has been from the garden this year, and the seventh grade will tell us of the world crops for 1912.

Starr (reading). "Autumn in a Garden."

Mary W. (*first grade*). Last spring we planted some popcorn, and this week we gathered it. We counted the ears, and there were 73 ears of corn. Here are two of the ears that we gathered *(holding up two goodly sized ears of corn.)*

James (*second grade*). Last fall we went to Mr. Hoy's farm, and he gave us two long ears of corn about this big, (*measuring off about ten inches between his forefingers*), and we saved them and planted them later on, and then yesterday we picked the corn and shelled it. These are the longest ears that we got (*showing two rather small samples*). We got a half gallon of corn, and we are going to feed it to our chickens.

Caroline (*third grade*). Last spring we planted our garden. We planted peppers and corn and cabbage, and this fall we gathered the corn, and here are the cabbages, and here are some beets, and here is the corn. The longest ear that we got measured eleven inches. Here it is, this long one.

Miss Musselman. I think the boy who raised the largest head of cabbage should tell us about it. I weighed it this morning, and it weighs nine and a quarter pounds. It is a very fine head of cabbage.

Henry (*fourth grade*). I think we have had a fine crop of potatoes this year. We sorted a lot of them when we dug them, and we have large ones and middle-sized ones and little ones. Here are some of the little ones. We are going to give them to the kindergarten, so they can feed them to their dolls. We are going to build a bonfire and roast the middle-sized ones, and the big ones we are going to sell, if we can get a price for them.

Mrs. Webster. The Lunch Room will be very glad to buy large potatoes.

Henry. Here is a lady that we made out of potatoes. Here is one of the middle-sized potatoes and here is one that looks like a pair of glasses (*fitting it to his eyes*).

Charlotte (*fourth grade*). Here are the beets that Caroline told about, and these two are curious shapes that we found. These on the stage are our whole crop. This is our very biggest one. And these are our prize carrots. These little ones we intend to give to the kindergarten. When we have our bonfire, we are going to cook potatoes and carrots. Each one is going to have one cooked in the fire, and then we are going to send the rest to Mary [the cook in the lunch room] to cook for dinner.

Mary P. (*fourth grade*). Our peanuts this year were a very disappointing crop. This is all we got (*holding a plant up with one nut on the root*). It was the only ripe one.

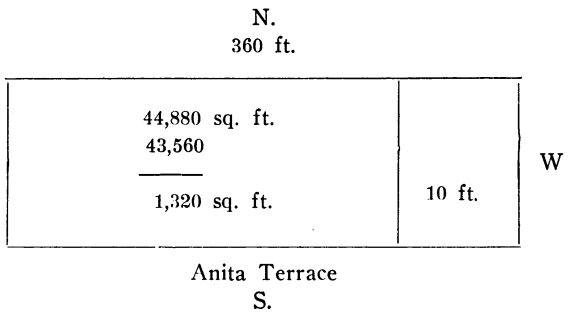
Christina (*fifth grade*). Last spring the fifth grade planted beans, peas, flax, and cotton. The beans came up very slowly, and the men [the gardeners who do the work during summer vacation] thought they were not going

to come up at all, so they planted tomatoes around them. The beans came up after a while, but although the plants were quite large, there were not many beans on them. The peas came up nicely, but there was no one here to eat them, and now the plants are all dried up. Only three of the cotton plants came up; and, probably on account of the cold weather, there is no cotton on them. We have taken them up and put them in pots and we are going to see what results we get.

Alfred (*sixth grade*). Last spring the sixth grade planted some herbs—twenty or twenty-five different kinds. Among them were thyme, rosemary, sweet marjoram, sage, dill, wormwood, and aniseseed. This is dill for the dill pickles. This is aniseseed. This is sweet marjoram. Most of the things came up very well and strong for the first year.

Polly (*seventh grade*). Here are some of the flowers that the seventh grade planted last year. We planted six hotbeds full of seeds. We tried to plant them so that we would have a yellow and blue garden, and one of mixed colors, and we tried to plant gardenflowers that would bloom in the fall.

Helen (*seventh grade.*) This diagram shows the girls' baseball field north of Anita Terrace:



We measured it the other day, and found that it contained 44,880 sq. ft. An acre contains 43,560 sq. ft., so if a strip 10 feet long is cut off one end, the remainder will about equal an acre. The third grade told about the corn they planted. They planted it on 56 sq. ft. of ground and got one-seventh of a bushel. If they had planted the same seed on one acre of ground, that is, this much of the north field, they would have got 111 bushels.

Mary (seventh grade). There are three main classifications of farm crops—grain, truck (vegetables) and fruit. The seventh grade made charts of the different grain crops in the different continents. There are so many kinds of vegetables that we did not have time to make a comparison of vegetables. This chart shows the number of bushels of wheat produced by the different countries in 1911:

WHEAT CROP OF 1911

	Bushels.
Europe	1,805,605,000
North America	864,262,000
South America	170,174,000
Asia	516,521,000
Australia	106,644,000
Africa	88,589,000

EUROPEAN WHEAT CROP OF 1911

	Bushels.
Belgium	15,745,000
Bulgaria	48,295,000
Denmark	4,466,000
Finland	125,000
France	315,126,000
Germany	149,411,000
Greece	8,000,000
Italy	192,395,000
Montenegro	200,000
Netherlands	5,511,000
Norway	271,000
Portugal	11,850,000
Roumania	93,724,000
Russia	447,038,000
Servia	15,312,000
Spain	148,495,000
Sweden	7,945,000
Switzerland	3,524,000
Turkey	20,000,000
United Kingdom	66,289,000

Europe, as you see, has a little more than twice as much as North America; North America, a little less than twice as much as Asia; Asia, more than twice as much as South America. The two heaviest wheat-producing countries in Europe are Russia and France.

Erna. This is a chart showing the value of products in the United States. The value of the corn crop is $1,565,258,000; wheat, $543,063,000; cotton, $859,840,000; coal, $716,286,000; gold, $96,890,000. Some people believe that gold is of the most value of all the products of the United States, but corn is far ahead of it. The value of iron is $327,334,000. It is about the smallest of those of great importance to our country.

Harnden. This is a chart showing the world's corn crop for 1911, 3,481,700,000 bushels. North America had 2,740,673,000; Europe, 585,732,000; South America, 32,539,000; Australia, 13,933,000. You see the difference between Europe and North America. The corn crop of North America is

the largest, and you will see that corn is the principal crop of North America.

Helen. Another important crop is rye. Europe raises the most, because they use principally rye bread. We raise so little because we use principally wheat bread.

One way to become conscious of the source of food, as we have said, is to produce it; another is to see it growing, as this report by the first-grade children and their teacher shows them doing.

THE FARM EXCURSION

Each autumn, after the children of the first grade have gathered and husked the popcorn which they planted in the spring, they make a trip to a farm. Many of the children have already visited a farm and have experienced the joys of riding on a hay-rack, sliding down a straw-stack and picking clover blossoms. They have undoubtedly observed the various kinds of work which are needed in caring for animals, and which the farmer finds necessary in the cultivation of his grain or vegetables, but the school excursion does more than repeat former experiences. It is not only one of sensuous pleasure, but it is related to essentials closely connected with the child's own life. This visit affords an opportunity for a variety of experiences, and through their interpretation is found an answer to many questions which have arisen from the work in domestic science, the study of primitive man, and the work in the school garden; and the visit aids the child more clearly to understand his work in literature. For instance, when the class was learning the rhyme,

"Little Boy Blue, come blow your horn,
The sheep's in the meadow, the cow's in the corn,"

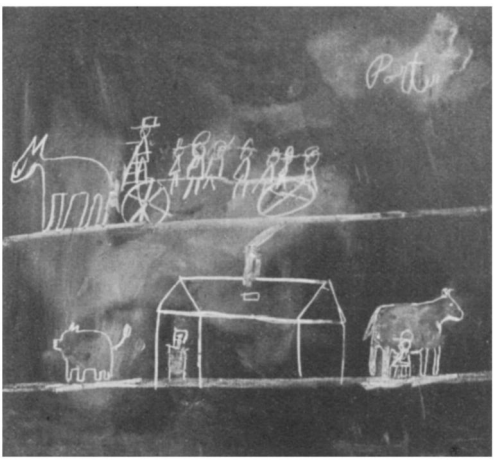
this question was asked: "Why should Little Boy Blue drive the sheep out of the meadow?" The children answered: "Because the sheep would trample down the grass, and the farmer wants it for the horses and cows to eat in the winter." Then they were asked, "Why do they want the cows driven out of the corn?" And Jean replied: "Because they need the corn for the pigs, or to put in the silo for the cows in cold weather." The trip solves such problems as this: Where do cream of wheat, rolled oats, corn-flakes, and flour come from, as well as cream, butter, eggs and the various meats and fruits that appear upon the table? It raises, too, new matters for solution relating to other social activities.

As the children step out of the car, they see the sun shining through the clouds perhaps, but not through smoke; they feel the cool, clean air, and smell the dry leaves and grass; they jog along the road in a hay-rack, wondering how long it will be before they slip off; and upon arriving at the farm they jump, run and shout. Here there is plenty of room, something to do, and many things to see and think about. The children visit the apple orchard, and, with the help of the farmer, climb an apple-tree and experience first hand the fun of shaking down the fruit. After doing this they more fully appreciate where their apples come from, and how they grow and are gathered. They see the great flocks of geese, turkeys, ducks, and hens and realize that the home of their Thanksgiving turkey was on a farm and that the eggs that they have for breakfast have taken a journey before reaching their plates. They now understand that the feathers or down in their pillows come from fowls, and the great number of feathers lying on the ground makes them realize the real meaning of moulting and why the fowls get their thick, warm winter covering.

The children now hasten to the pasture, near the barn, to look at the fine herd of cattle. The farmer has given them permission to go into the long, low, dimly-lighted stable; and with great delight they walk very quietly and with subdued voices so as not to frighten the little calves and the great bull fastened in one of the stalls. They enter the pens where the calves are walking about and gently stroke their soft backs and pretty faces. They look into their large round eyes and smell their fragrant breath. Then with something of awe and trepidation they slowly walk down to where the bull is bellowing because of the unaccustomed sight of so many visitors. They watch the farmer as he gently strokes the animal's broad back and with an assuring tone speaks to the great creature, which ceases to bellow when he knows his friend is near. The children see that this warm stable is where the cattle are kept during the long, cold nights and days of winter. The farmer has consented to milk a cow, and the process is watched with great interest, because some of the children have never seen a cow milked and only know of milk as it appears upon their tables or as it is seen in bottles brought by the milk man.

The machinery that is standing about is a source of curiosity. They examine the plow, harrow, hayrake and all other machinery

that the farmer may have. Touching the various implements, looking them over, and climbing upon them tends to fix in the child's mind not only the machine itself, but its uses as well. Later this knowledge helps to form a basis of comparison, for when the child begins to use a spade and a hoe to loosen the soil in his garden, if he knows that the farmer is using a plow in his great field for the same purpose, and if he learns that the Indian simply scratched



FIRST-GRADE DRAWING OF FARM

the ground with a stick, he begins to look for a reason for the great difference between the white man's implements and those used by the Indian. He appreciates, too, that the primitive man with his crude tool must live almost entirely upon animal food, while he himself has the benefit of all that the soil produces. He can see that this difference is due to the men who thought out ways of making better tools and to the hard work of the farmer, who he feels is his very good friend.

In the schoolroom the different experiences gained on the excursion are organized and related to bits of knowledge similar to the examples already given. The children give the names of the various meats they eat—pork, veal, mutton and beef. This list is accompanied by the names of the animals to which each kind of flesh belongs. The food and shelter of animals are topics which are separately discussed, and the following points are also considered:

Why do fowls moult in the fall?
Why do animals shed their hair or fur in the fall or spring?
Why does the pig have such a long nose?
Why is the food in the silo good for cattle?
How do we prepare food for our own winter use?

The experiences and facts gained are written upon the board and used as reading lessons. The children draw pictures of animals upon the board, writing the name of the animal and its food. Other pictures of the farm are drawn and painted, showing the corn-field and apple-orchard, and as another form of expression a farm is made in the sand-table, the animals being modeled in plasticene. All this helps to make a beginning for the work in domestic science, nature-study, and industrial history.

This year we summed up the experiences gained in visiting a farm in a morning exercise given to the entire school. The verbatim report of it follows. To the reader this may seem very choppy and disconnected, lacking in rhythm and beauty, but if he had seen the faces of the children, heard their piping voices, and felt how intense was their desire to make everyone understand what they saw and did at the farm, he might think differently.

MORNING EXERCISE—FARM EXPERIENCES

Tuesday, January 19, 1915

Bobby. We took the Northwestern train and got off at Lombard. Mr. Hoy met us with a hay-rack, and we rode to a corn field, and then we came back and got off.

Joan (showing stereopticon picture). Here is the hay-rack with the mothers and children on it, and Mr. Hoy driving.

Fred W. Then we went and saw the horses. Horses are used to draw the hay and the corn and everything needed around the farm. In the summer the horses eat grass, but in the winter they eat corn and hay.

John. A long time ago they had a big thing like this *(showing a picture)*, called the scythe, and used it to cut the grass. But the man got so tired, and he said, "Oh, my, I wish I had a long scythe out here to cut the grass, and some horses," and a man made something like that *(showing)*. A long time ago there was a rake like this used on big farms and little farms. And the man got so tired, and he said, "Oh, my, I wish I had a big machine just like this, with two wheels and horses," and soon a man made something like that. And they had a rake like that at Mr. Hoy's.

ARRIVING AT THE FARM

Billy. This is the way they stacked the hay up. They stack it up with pitchforks, and this is the way they load the hay on the hay-racks. They load it up with pitchforks. And sometimes they stack the hay up with the hay-loader on the hay-racks. And they load the hay in stacks with pitchforks like this. We saw the hay at Mr. Hoy's and slid down in it. And we told stories.

Fred R. This picture shows a mowing-machine used to cut wheat. This big wheel goes around and drops down under the knives. This is the way they stack the wheat, so the rain won't get in. They put a stick in the top and tie some of the wheat to it, and that makes a little roof, for if the rain got on the wheat it would make bad flour, and if it got in the oats it would spoil the oats so the cows and horses would not like it.

When we were at Mr. Hoy's we were on a straw-stack. When it rains out in the pasture, the cows and horses go up beside it so they won't get wet.

Norman. This is a picture of the straw-stack. We climbed up on the straw-stack and slid down.

These are the cows in the field *(showing picture).* Those are the children with the cows.

Elizabeth. When we were at Mr. Hoy's we saw a cow milked, and the boys are going to show you how to milk it. *(Boys give pantomime.)*

Betty. When we were at Mr. Hoy's we saw the calves, and when we saw them they were afraid. We saw them wash the bottles and strain the milk in the bottles.

ON THE STRAW STACK

INTERESTED OBSERVERS

John L. They put the milk in the can, then take it to the train and put it on the train, and then the train takes it to the city, and they take it off and take it out of the cans in some bottles and go around and sell it.

Billy. First they take it off the train in cans and shoot it down a little chute like this, and shoot it right into the milk-wagon and put it in the bottles and go around and sell it.

Fred W. This is a separator *(showing picture).* We saw a separator out in the barn, and they put the milk in there and turn a crank, and cream comes out one side and milk out the other.

Joan. This is where we told stories in the barn *(showing picture),* and this is the big silo to put the winter food in.

Joan. When we were at Mr. Hoy's, we saw the corn put in stacks like this *(showing picture),* and here is a corn-cutter. And we saw a silo. They put corn in it, cut in fine pieces, to feed the cattle in winter.

Billy. At Mr. Hoy's we saw cattle, cows, horses, and pigs. The pigs give pig's feet, sausage and bacon, and when they eat out in the pasture, they eat roots and dig with their noses, and their noses are long. And they drink milk and eat corn.

Charles. This is a plow. They use these plows for little farms, for plowing up the earth. Another kind digs up potatoes. When we were at Mr. Hoy's we saw a plow, but it was not working. Way out west they use this kind of plow for big farms. *(Picture of steam plow.)*

Avis. When we were out at Mr. Hoy's we saw turkeys, chickens, and ducks and geese. And the feathers fall off in winter, and they get warmer feathers.

Fred. My mother got some feathers to trim the baby's bonnet.

Wharton. Mr. Hoy put us up on the limb of an apple tree. Some of the children shook the limb, and some of the apples fell down, and some of us gathered osage oranges. There were osage oranges from the hedge. Sometimes they get ripe, but osage oranges are not good to eat. They are green.

This is a picture of the apple orchard *(showing picture).* The children are out there gathering apples at Mr. Hoy's.

Miss Cooke. You must have had a very nice time. How many have been at that same farm? *(Many hands.)* Then you know just how nice it is. Is there anything else to add about a farm?

Child. When I was out at a farm—I think it was 8,000 acres, I went to a dairy and saw the man milk the cows, and there was a white cat there. We saw some horses, and I think there were some chickens.

THE CHILDREN GATHERING APPLES

Miss Cooke. That makes me think of a farm I visited last year, where the oldest little girl had learned to milk the cow. She had two kittens. Every morning when she went out to milk the cow, she would have the kittens sit up on her back, and they would open their mouths, and she would milk into them.

Child. When I was out at the farm, we husked corn. When you husk corn you have to use gloves, or else you will get your hands cut.

Mary. When I was out at a farm, I saw them husk corn. They had a great big husking-machine, and the corn that was not husked I helped to husk.

Elizabeth. One summer I was on a farm where they had three cows. There was a little nest of birds up in the eaves at the top of the barn, and one day when the farmer was milking the cows, the birds got out on the edge of the pail and drank the milk out of the pail. I thought it was very queer that birds would drink milk.

In the fifth grade, beside the garden experience and the excursions, goes a more careful study of one of the most important sources of our food, which adds breadth and completeness to the memories carried from the first grade.

CORN AS A TYPE OF THE GRAINS

Corn is chosen for the study as a type of the grasses, not only because it is historically and economically our greatest American cereal, but also because it exhibits in greatly enlarged form and variation the characteristics of the other grains. Its size aids greatly in gaining attention and giving clearness to the characteristics of grasses, while the comparison with other grains secures accuracy and breadth to the study.

"We compared the corn with grass and trees," says one pupil. "The roots of the corn are called fibrous roots, and are very long, slender, and numerous. The roots of the pine-tree have one main tap-root and many other branch-roots growing out from it. The corn cannot live all winter as the pine tree can. The latter stores up food in the roots and trunk for winter."

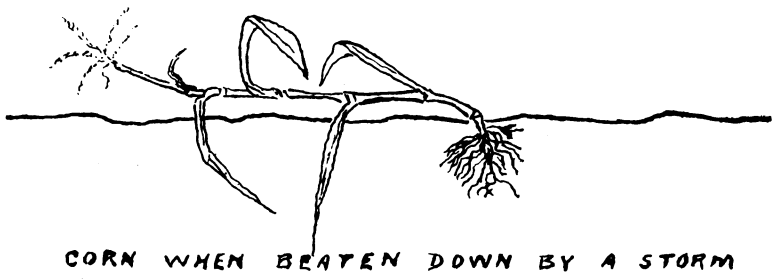
"Corn really is a grass," says another pupil. "The fibrous roots, nodes in the stem, and long slender leaves are like those of the grasses. The corn-blade has no stem, as most leaves have, but has what is called a sheath. This, instead of fastening to the stalk as a stem does, encases the stalk. Dirt frequently collects between the sheath and the stalk. Rain wets it, and smut develops in the corn. The long leaf has a much stronger attachment to the stalk, however, and helps to strengthen it. The corn leaf is a great deal longer than ordinary leaves, so it must have something else to help hold it up besides the sheath. It has what is called the midrib. That is a stiff kind of rib, which runs through the middle of the leaf. This helps hold the leaf up to the sunlight a great deal better. The veins in the corn-leaf run lengthwise. There are very minute veins, also, that run crosswise that are so small they cannot be seen by the naked eye. We looked at them through the microscope."

"The veining of the leaves and the construction of the stalks," writes Henry, "are as interesting to me as the construction of a locomotive is to an engineer. When you get to know the plants, you feel as though you ought to have a garden where you can take care of real plants and study them."

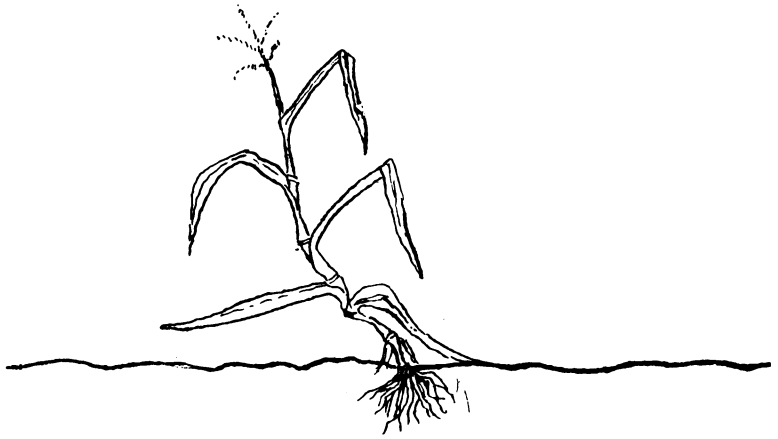
"Plants move," writes Ruth, "though many people do not know it. It is true that they do not move with a jerk, but they move very slowly. When the corn gets beaten down by a heavy rain or hail storm, it gradually works itself up again, although it never gets perfectly straight as before. When we move, we bend our joints. That is the way also with the corn. It bends at the nodes."

"Plants absorb water from the ground through their roots. If we sprinkled water only on the leaves of a plant it could not live. A plant also must not have too much water. A tree would not grow in a lake. Sand or gravel never gets so wet and soggy as clay does. That is the reason we find trees growing on the sand-ridges of the Chicago plain."

"When we eat apples," writes Ruth, after the class had made a com-



CORN WHEN BEATEN DOWN BY A STORM



CORN WHEN IT HAS RAISED ITSELF UP AFTER A STORM

ILLUSTRATION FROM RUTH'S PAPER

parative study of various seed-forms, "we are really eating the pistil of the plant. The bananas, peaches, and plums we eat are also just the flower pistils. The pistil is the part of the plant in which the seed is developed. In the case of the wheat, the chaff is the corolla and calyx, surrounding the kernel, and the stamens which hold the pollen."

In the fifth grade the children get a more comprehensive view of the subject of food converting than they did in the second. There they add to their own crude hand-milling visits to grain elevators and flour mills, and the use of printed information.

FLOUR MILLING

For the type in flour milling, we turn to wheat. Barbara says:

"The first thing I did was to mash the wheat with a potato masher as fine as possible, and then to sift it through a wire sieve. Then I ground some more wheat as fine as possible and then sifted it through a piece of cheese-cloth. Then I put the material in four bottles: in the first, unground wheat; in the second, what was left after the first sifting; in the third, what went through the first sieve; in the fourth, what went through the cheese-cloth."

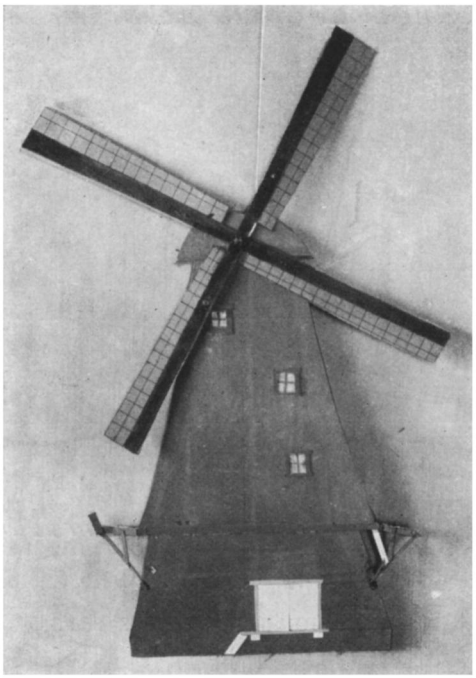


DIAGRAM OF THE EXTERIOR OF THE OLD DUTCH GRIST MILL

Another pupil, writing about an excursion to a grist mill, says:

"We went to visit an old wind mill near the Des Plaines river. When we got close to it, we saw that one of the driving-wings was broken off. The mill is about forty years old. There are five floors, counting the top, which will turn around. The inside of the mill looks much better than the outside. In a great many places the shingles have come off, and the balcony, which may be entered from the second floor, is tumbled down on one side.

"A wagon drives up to a little platform about three or four feet broad. Then the wheat, which is in bags, is carried in and dumped into a hopper through an opening in the floor.

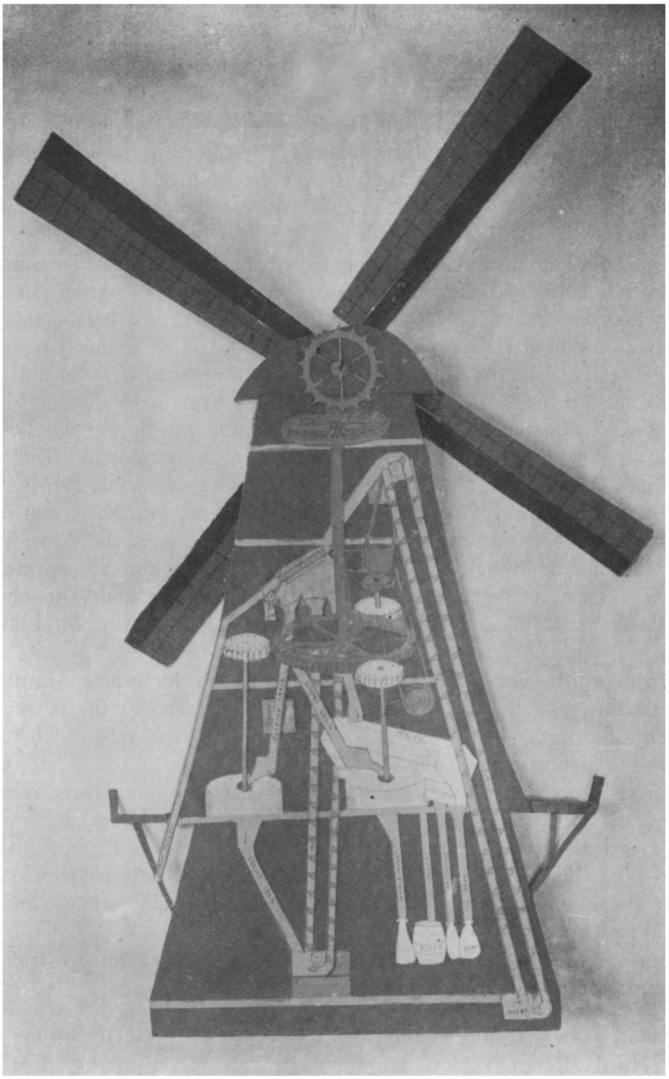


DIAGRAM OF THE INTERIOR OF THE OLD DUTCH GRIST MILL

"The grain elevator passes through the first floor, and consists of a number of tin cups fastened to an endless belt and the whole boxed in. When the wheat reaches the top floor of the grist-mill, it is dumped down a chute to the receiving-separator. This separator is made of two sieves, cylindrical in shape. One of them is within the other. The inner one extends a little

further out at the end than the outer sieve and empties into a chute. The mesh of the inner sieve is large enough to let the wheat through, while the outer sieve is too fine, but will let mustard seeds or cockle go through. The wheat, chaff, and screenings then fall each into a different chute.

"On the second floor the wheat is ground and sifted. It is ground by millstones, as was all wheat forty years ago. There are only ladders from one floor to another, and they get steeper from story to story. A door at one side leads to the balcony, from which the miller can reach the rope to operate the brake on the top floor.

"The grinding-stones were imported from France, and are incased to keep the wheat in and the dust and dirt out. The upper stone, or runner, turns, while the nether millstone is stationary. There is a bell in the bottom of the feeding-hopper that will ring as soon as it is no longer covered with wheat. It thus gives the miller warning when the wheat has run out. There are two sets of millstones in this mill. They are turned by an iron axle running vertically through the mill and geared to the power-windwheel on top. After the wheat is ground, it is taken up in an elevator to a chute which puts it into the middlings grader. The wooden frame of this reel is covered with silk bolting cloth of two grades,—the first three-fourths is real fine and the last quarter is coarse cloth. Through the first goes the flour, through the second the middlings, while the bran is dumped into a separate chute. There is a screw conveyor under the reel to shove the flour and middlings along to one end and down the chutes to the first floor, where the bags are filled."

"On the third floor there is one great big wheel, thirteen feet in diameter, which has cogs on the rim of it, and which is geared to the power-wheel. On each side of the big wheel are two small pinion-wheels which turn the axles of the grindstones on the floor below."

"There is nothing on the fourth floor. On the top floor there is machinery to make the axle of the big wheel turn, changing from the horizontal to the vertical shaft. Here, too, is the brake to stop the mill, and the smaller windwheel to furnish power to operate the wheels on which the cap turns. There is very little iron in the whole mill. The wheels and many of the shafts are of oak.

"Leaving the mill, when we got on the main road again, we had a very picturesque view, and felt as if we were in Holland."

After this we made an excursion to a modern roller-process mill. Here the operation is more complicated, but by the aid of our earlier experience at the grist-mill, and by the study of working models on the walls of the classroom, the children gained a very clear conception of the process. One of them thus writes of the differences between the two mills:

"In some ways the patent roller-mill and the old grist-mill are very different. In the grist-mill the wheat is ground only once, while in the patent mill it is ground from four to eight or nine times. The advantage of having

THE OLD DUTCH GRIST MILL

the wheat ground more than once is that the more grindings the wheat goes through, the freer the bran gets from the starch and gluten. In the grist-mill, the middlings are used for feed. but in the patent-process mill the middlings are ground again and made into flour. In the old grist-mill the millstones are, of course, made of stone, but in the roller-mill the grinders are made of steel. The steel rollers have corrugations on them, though some of the rollers are perfectly smooth. The old grist-mill had no middlings purifier. This is because they have no use for the middlings. But the patent mill has a middlings-purifier."

Thus is the subject of the source of our food-supply opened up, to be continued in the commercial geography of the high school.

The earth produces vegetables and grain, and our children have seen the miracle happen. But they need to know how great a task

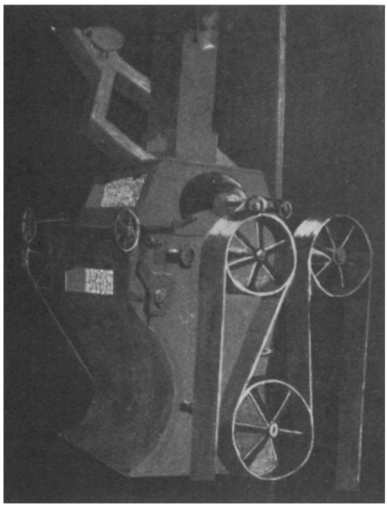


DIAGRAM OF THE EXTERIOR OF A PATENT PROCESS ROLLER MILL

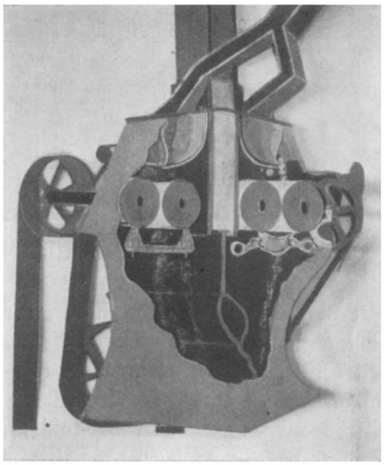


DIAGRAM OF THE INTERIOR OF A PATENT PROCESS ROLLER MILL

it is to prepare the natural product for man's consumption. How shall they be shown? A morning exercise given by a second grade, after three or four months' work with foods, illustrates how those children learned by actual experience about food conversion.

MORNING EXERCISE—FOOD

April 3, 1913

Judy. The second grade has been talking of the many kinds of food that people eat. Last fall we gathered the corn that we planted in the first grade, and we husked it and fed it to the chickens. And we have been to the grocery to see what kinds of food people get there. And then we went to the truck-gardens, and we saw radishes and lettuce and different kinds of things, and we wondered how these things got to the groceries in different parts of the city. Then we went down to South Water Street and saw the railroad tracks and the trains going back and forth to Chicago. And there were different kinds of fruit there, and all sorts of vegetables. Our mothers had been canning fruit and putting it in the cellar, and in the kitchen she has a bin for flour and meal, where she mixes bread every day, and we wanted a chest for our own, and we made one.

James. My chest is all filled, and in each little place there is one bag of flour—wheat flour, rye flour, corn-meal, oatmeal, buckwheat, and barley flour. Before we made our flour, we brought different kinds of breakfast food from home—oatmeal, Quaker oats, and lots of other kinds. We knew our fathers and mothers would not give them to us to eat unless they were good for us, and we wondered what was in them. We tested them, and poured a little iodine on them, and if it turned blue, that showed there is starch. This is Quaker oats *(holding up a glass tube and performing a test).* This is corn flakes *(again making test).* That turns the same way, and that happens to all the others.

Dickey. Mrs. Webster told us that starch helped to make us fat, and we thought it ought not to make us fat only, but strong and grow and have muscle, and that it ought to have something in it besides starch, and so we got some bags and string, and we took the flour that we had in the chest, and we put one kind in each bag, and we tied it up and got a cup of water and set it on our desks. And we put the bag into the cup. Only once in a while we would shake it up and down, and the water would turn white, and that was the starch in it. We left it there all night, and the next morning we opened our bags, and every one looked sticky, except the cornmeal, and the cornmeal would just crumble, and I wonder if you can guess which was the stickiest—buckwheat or wheat flour or rye or cornmeal or barley? Can you guess which was the stickiest? Yes, the wheat flour was the stickiest. It was so sticky you could just pull it like gum. That showed that it had gluten in it, and gluten makes you grow and have muscle and be strong.

Robert. I'm going to tell you how we made flour. We took some of this wheat, and we threshed it with our hands, and then we blew the chaff away like this. Then we took some oats and threshed it like this *(rubbing it between his palms).* But the oats are much harder to thresh. And this is much easier. The husks stuck to the kernel much more than the wheat did. We decided that we would not thresh it all with our hands; it was too hard,

so we went over to Mrs. Webster's. She had some that was threshed with a great big threshing-machine. So we ground the wheat with a mortar, but it was not fine—we could not make it very fine. And then we sifted it through cheese-cloth, and then we sifted it through silk—like the great big mills use. And we could not sift it all, because it would be too hard, so not all of our boxes of flour are pure.

Olga. When the second grade made their corn-meal, they tried to make it like the Indians made it. The Indians had big stones, with rough ridges across the stone. But we did not have a stone with rough ridges, so we used a grater. We rubbed the corn on the grater, but the grains of corn were too dry and rolled off. Then we tried a coffee-mill, which was better and easier than a mortar and pestle or a grater.

Robert. There is something nice and useful that is written down on a piece of paper and folded up under each little bag of flour. It is for our mothers, and not only for our mothers, but for other people who want to cook. Can anybody guess what it is!

A Child. A recipe.

Robert. The first time we went over to Mrs. Webster's, we had the recipe written on the board, so we studied it carefully, and then we did our cooking. Then when we came back to our room, Miss Enoch did not know what the recipe was, so one child would tell it, and if he made a mistake, the other children would correct him, and in that way we got it right. And the first one we wrote wasn't good. It had too many "I's" and the people's names in it, so we took a pencil and put a circle around each word we did not need, and then we took the recipes over to Mrs. Webster and showed them to her. She said they were only big enough for one person, and we wanted them big enough for a whole family. And so we made them four times bigger. I will read you one. This is chocolate caramels:

2 cups of brown sugar.
1 cup of butter.
¼ pound of Baker's chocolate.
½ cup of Karo corn-syrup.
½ cup of milk.
1 teaspoon of vanilla.

Put all together except the vanilla, and when the candy is done, you can put the vanilla in. Try it in some water, and if it is hard, it is done. If it is not hard, it is not done.

William. After we had done a lot of baking with Mrs. Webster, we visited a big bakery. We visited Mr. Bartel's bakery and saw Mr. Bartel make a cake. He put it in a mixing bowl this big *(measuring it off with his arms),* and then he put it in a barrel. He put lots of things in, and each time he put something in, he stirred it up with his hands. After he had put all the things in, he made different little cakes, and there were twenty-nine altogether. Two of them were birthday cakes. He threw the dough over

into the pan, and I thought it would go all over the floor, but he didn't make a muss, and after he had put the cakes on, he put the shovel into the oven and shoved them far in. While the cakes were baking, he thought he would make chocolate frosting, and when the cake was done, he put English walnuts on it, and then we took it home and had it for lunch.

Elizabeth. He bakes a hundred and fifty loaves at a time, and three hundred rolls. He bakes his cake in the daytime. He sends over thirty loaves of bread to Mrs. Webster every day.

We took all our recipes that we had used this year, and we thought it would be nice to make a cook-book of them, and we thought what kind of a cover we would like to make. We wanted something that would be pretty and something that would make you think of what was inside. Here is one of the books *(showing various books).* On this cover there are some loaves of bread, and there is a big mixing-bowl, and a barrel, with a baker. And there is another with the long shovels, and this is a birthday-cake, and this is a man cooking. There are ten little recipes in here—grape jelly, grape juice, Quaker oats, rye muffins, corn-starch pudding, johnny-cake, bread-making, chocolate caramels, barley muffins, and cup-cake.

D'Orsay. This is the white corn that we used to make hominy. And this is the hopper that we made the lye in. The hopper has a hole in the bottom, and on it we put straw to keep the ashes from spilling out, and then Mr. Hendry saved some wood ashes for us, and we filled the hopper and then poured water on the ashes. And we measured the water, and we found that we had thirty-six cups of water and three cups of lye. It took four days to make the lye.

Benjamin. This is the way we made the hominy. We had one and one-half cups of white corn, and it weighed nine ounces. We soaked it in three cups of lye for three days. And then we took it out and washed it thoroughly so it would not make our hands hurt when we touched it. It looked yellow inside. But that was just the skin. Then we rubbed it to take the skin off, and then we sent it over to Mrs. Webster, and she cooked it for six hours. When we brought it back again, we weighed it, and it weighed twenty-one ounces. We measured it again, and there were almost four cups. We had it for lunch.

Miss Cooke. That was very good hominy, too.

Stephen. There is something good and dry and sweet, under the tray in my chest. Can anybody guess what it is? It is made out of grapes.

Child. Raisins.

Stephen. We put our grapes on the radiator to dry, and it took fourteen days to do this. The first day we had five pounds. The first time we weighed them, they had lost three ounces *(showing the weights).* Then we put them back and changed them around, and the next time we weighed them, they had lost two pounds and four ounces *(again holding up the*

weights). And the last time we weighed them, they had lost six ounces. Altogether, they lost two pounds and thirteen ounces, and we had left only two pounds and three ounces.

Alexis. There are dried apples in the bottom of my food-chest. When we weighed the apples, before we dried them, they weighed two pounds and seventeen ounces. After they were dried, we weighed them, and they weighed one pound and seven ounces. They had lost altogether one pound and ten ounces, and when we had dried the grapes and apples, we wanted to taste them and see how they were. We tasted the grapes and they all said they were sweet, and when we tasted the apples, some said they were sweet and some said they were sour, and some didn't like them and some did like them. And we wanted to make a test, to see if the sweet had gone out or not. We had two pans, one a wide, shallow pan, one a deep pan. We took a half cup of sugar, half a cup of water, and we stirred them up, and put one-half in each pan, and set them on the radiator. And then, in three days, the water was all gone, and we measured the sugar, and it measured a half a cup, and that showed that the sweet didn't go out of them, but that it stayed in.

There remains, of course, the large subject of the actual cooking of foods. This is a cumulative experience in our school, beginning with the popping of corn in the kindergarten and ending with the preparing of a three-course luncheon in the high school, continuing from the making of butter and cottage cheese in the first grade to a careful study of milk and milk-handling in the tenth, and from the baking of tiny bread loaves in the second to a study of yeast and doughs and batters in the sixth. But we have nothing new to tell on a matter so well worked out in schools all over the country. The purpose of this paper has been, rather, to point out the larger activity of which cooking is but one phase, to suggest that we put emphasis upon the ideas associated with cooking, that we give it an intellectual and social background.